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# Studies on Ship's Bottom Paints. (II) : Sedimentation Volume of Ferric Oxide

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[this Bull. 21 1, (1950)],  $C_0$  can be given approximately by the relation

$$1/C_0 = 11 Q$$

where  $Q$  is the heat of combustion. Results obtained are shown in the Table II.

Table II.

	Q Kcal	Flash Pt. °C	Limit of Inflammation, $C_0$ (%)	
			obs.	calc.
Camphor	1,410.7	80	0.91	0.78
Naphthalene	1,231.9	84	1.00	0.91
Phthalic acid anhydride	783.8	149	1.65	1.44

## 19. Studies on Ship's Bottom Paints. (II)

### Sedimentation Volume of Ferric Oxide

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The sedimentation volume of ferric oxide in various liquids was measured in order to investigate lyophilic properties of rouge, an important pigment of anti-corrosive ship's bottom paint.

Commercial ferric oxide was washed with benzene, alcohol and water. It was dried at about 110°C for several hours and finally in  $\text{CaCl}_2$ -desiccator for a few days. The average particle size was about 2 microns in diameter. 2 gm. of the ferric oxide was dispersed in 20ml. of each liquid and its sedimentation volume was determined after complete settling.

The chief results may be summarized as follows.

- Non-polar liquids, such as benzene, ethyl butyrate, cymene, mineral spirit and solvent naphtha, gave larger values of the sedimentation volume: polar liquids, such as pyridine, oleic acid, methyl alcohol, ethyl alcohol and butyl alcohol, gave smaller values.
- The sedimentation volume of dry ferric oxide in wet benzene showed a tendency to decrease with the water content. On the other hand, addition of moisture to ferric oxide increased the sedimentation volume in dry benzene.
- Addition of other polar compounds, such as oleic acid, alcohols, rosin or dioxane, to dry benzene decreased the sedimentation volume of dry ferric oxide.
- Addition of water to methyl alcohol had a slightly increasing effect on the sedimentation volume.

e) Presence of ferric chloride caused the sedimentation volume of ferric oxide in water to decrease remarkably.

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## 20. Purification of Rice Oil. (Supplementary Report)

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In the previous reports on the purification of rice oil (this Bulletin, Vol. 20, 64, (1950); *ibid.*, Vol. 24, 24 (1951)), it was mentioned that the surface active impurity in crude rice oil could be easily separated as the deposit which was coagulated at oil-water interface, if an emulsion was formed by mixing the oil with dilute aqueous solution of some acids or salts, and it was de-emulsified at room temperature. In order to know the more detailed mechanism of the separation of the impurity from crude rice oil, some experiments were carried out. The results, thus obtained, may be summarized as follows:

1. The emulsion, which is formed from rice oil and dilute aqueous solution of some acids or salts, belongs to water-in-oil type.
2. The time required to complete the de-emulsification at room temperature varies with the purification degree of rice oil from which the emulsion is formed, and the samples, which show longer de-emulsification time, produce more deposit at oil-water interface after the completion of the de-emulsification.
3. The interfacial tension between rice oil and water varies with the content of the impurity and free fatty acids in the oil; for example the interfacial tension is considerably reduced in the case of a oil with higher acid value by a small amount of the impurity, such as rice wax, partially decomposed tri-glycerides and iron soaps which are the principal components of the deposit.
4. From the experimental facts (1~3) mentioned above and the microscopic observations regarding the emulsion and the deposit, it may be deduced that the separation of the impurity from crude rice oil is caused by the orientation of surface active substances at the oil-water interfaces of the emulsion formed from the oil.